IAFMM Fish Meal Flyer

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A COMPARISON OF FISH MEAL VERSUS SOYABEAN MEAL AS PROTEIN SUPPLEMENTS TO CORN-COB MIX LIQUID FEEDS FOR GROWING/FINISHING PIGS

(Translated from a report by Professor K.D. Gunter, University of Göttingen, W. Germany)

SUMMARY AND CONCLUSIONS

A trial is reported comparing fish meal and soyabean meal as protein supplements to corn-cob mix liquid feeds fed to growing/finishing pigs at the University of Göttingen. The following points emerged from the trial work:

1. Fish meal fed under practical conditions to pigs of average quality should ensure growth rates of around 700g daily, a feed conversion of 3.0:1, and a growing/finishing period of 110 days. The productivity should be superior to that achieved using soyabean meal as a supplement.

2. Fish meal in diets of pigs did not depress feed intake compared with soyabean meal; it was increased in the trial.

3. The liveweight gain in the finishing period was superior with fish meal (by 20.7%), and the gain for the total growing/finishing period was 9.1% higher, compared with soyabean meal fed pigs.

4. The feed conversion in the finishing period was 4.7% better, and 1.7% better over the total period, comparing fish meal with soyabean meal as the main protein source.

5. Carcass quality, as judged by practical criteria, was similar for both the fish meal and soyabean meal fed pigs.

The findings of the trial confirm the high feeding value of fish meal as a protein supplement in liquid growing/finishing diets based on corn-cob plus cereals. Feeding technique in such systems is important, and especially clearing of the trough after previous feeding, and the use of good quality fish meal.

Under the above conditions which apply to all liquid feeding systems, fish meal represents a highly valuable feed component providing protein to complement corn-cob mix in a liquid feeding regime. The use of fish meal is therefore recommended for pigs in this type of system. Its use should not be limited to finishing pigs; it is also recommended for feeding to sows.

Introduction

Corn-cob mix prepared from the whole maize cob at the milky ripe stage is now used extensively in pig feeding in central and southern parts of West Germany. The corn-cob mix (CCM) high starch feed is generally fed in liquid feeding systems as the main cereal source, supplemented with protein, minerals and vitamins.

In prelimany trials at Haus Düsse experimental station in Westfalia-Lippe, West Germany, there was an indication of depressed feed intake when pigs received a fish meal supplement with CCM fed in liquid form. Further trial work has now been undertaken at the University of Göttingen by Professor K.D. Gunther and his colleagues to compare fish meal and soyabean meal as protein supplements to CCM fed in liquid form to growing/finishing pigs. His report of the trial is given below.

Trial at University of Göttingen

A trial was undertaken with growing/fattening pigs, reared under practical conditions, to compare effects of either fish meal or soyabean meal as supplements to corn-cob mix on growth and feed conversion. The most frequently used method of CCM feeding, i.e. liquid feeding, was employed. Ignoring economic considerations, fish meal and soyabean meal were used as the sole protein supplements in order to give a more critical test of the nutritional contribution of the feeds.

Diets

The soyabean meal was supplemented with synthetic lysine and methionine to equate the content of these amino acids in the two supplementary proteins. The complete diets offered to the two feeding groups (containing fish meal or soyabean meal), were equated in terms of their contribution of energy, lysine and methionine. For both diets, mineral/vitamin supplements were included which were formulated to ensure requirements were met.

The trial was also designed to monitor the effects of the diet on feed intake.

The pigs received liquid feed which consisted of CCM silage of good quality with a supplement consisting of wheat, wheat bran, either fish meal or soyabean meal, and a mineral/vitamin supplement. Details of the nutrient composition of the CCM are given in Table 1.

The composition of the supplementary feeds is given in Table 2, and their nutrient analysis in Table 3. The level of CCM silage in the diet dry matter was 50%. In the liquid feed there was about 25% CCM, 14% supplementary feed and 61% water. The dry matter content of the liquid feed over the test period averaged around 25%. The composition of the liquid feed and its nutrient content are given in Table 4. The diets were offered twice daily. Separate drinking water was not offered. The daily amounts of feed offered were recorded.

Animals and Housing

A total of 320 pigs of both sexes was used in the trial. They were obtained from the local market at a weight of around 20kg. After a brief period for adaptation, they were randomly divided into two equal test groups consisting of the same number of castrated males and females. The experimental animals were housed in pens, holding 10 to 13 pigs, on mesh floors. The housing was well ventilated, and heating was available when required.

Pigs were individually weighed at the start of the trial, at the end of the growing period, and at the end of the trial. After slaughter, carcass weight and quality class were recorded, along with slaughter yield which was calculated from liveweight and carcass weight.

Results

Pigs started the trial when about 28kg liveweight, and reached an average weight of around 62kg at the end of the growing period. They then continued on trial (finishing period) until they reached an average weight of 101kg to 105kg. Details of liveweights and growth rates, etc. are given in Table 5.

The growing period was the same duration for both treatments. However, in the finishing period, the mean number of days to reach the final weight was 48.5 for the fish meal group and 53.2 for the soyabean meal group, i.e. the total test period differed by nearly five days in favour of the fish meal fed pigs (110 versus 115 days).

Average growth rates in the growing period were 559g for the fish meal fed pigs and 549g for the soyabean meal fed pigs, the difference not being statistically significant. In the finishing period the daily liveweight gain for the fish meal group was 875g and for the soyabean meal group was 725g, the difference being statistically significant ($P<0.01$). For the whole trial, the average liveweight gain was 700g per day for the fish meal group and 640g per day for the soyabean meal fed group, this 9% difference being statistically significant ($P<0.05$) (see Table 5).

Based on a growing/finishing period of 110 days, it was calculated that the extra average weight gain of fish meal group pigs was 6.4kg. A further calculation based on equal weight gain by the pigs on both treatments indicated that the period taken to reach finishing weight in the fish meal group was ten days shorter than that for the soyabean meal.

The average feed consumption in the growing and the finishing periods was 3.5% and 4.9% higher respectively for the fish meal group than for the soyabean meal group (see Table 6). The trial indicated that the use of fish meal affected feed consumption positively rather than negatively. Feed conversion in the growing period was similar for both treatments. However, in the finishing period, feed conversion was 4.7% better for the fish meal group, that is, they required 4.7% less feed to achieve a given weight gain. Over the total trial period (approximately 110 days), feed conversion by the fish meal fed pigs was 1.7% better than that by the soyabean meal fed pigs.(see Table 7).

Carcass measurements for pigs on both treatments were similar (see Table 8). The slaughter yield and carcass grading for both treatments were considered average.

TABLE 1: NUTRIENT CONTENT OF CORN COB MEAL

Dry matter %	57.3		
As % of the dry matter:			
Crude protein	10.0	Sugar	0.3
Crude fat	4.2	Crude fibre	3.7
Crude starch	66.2	EZS: (Calculated energy sum)	84

TABLE 2: COMPOSITION OF THE SUPPLEMENTARY FEED

Fish meal treatment		Soyabean meal treatment	
Wheat	56.0%	Wheat	54.9%
Fish meal 64	24.0%	Soyabean meal	36.0%
Wheat bran	15.0%	Bone meal	3.0%
Mineral/Vit. mix	5.0%	Mineral/Vit. mix	5.0%
		Rock salt	0.6%
		Lysine HCl	0.30%
		DL-Methionine	0.25%

TABLE 3: NUTRIENT CONTENT OF THE SUPPLEMENTARY FEED

Fish meal treatment		Soyabean meal treatment	
Dry matter	86.6%	Dry matter	87.2%
As % of the feedstuff:		As % of the feedstuff:	
Crude protein	22.7	Crude protein	23.1
Crude fat	2.4	Crude fat	4.4
Crude starch	30.3	Crude starch	33.9
Sugar	6.6	Sugar	3.2
Crude fibre	3.7	Crude fibre	3.0
EZS: Calculated energy sum	60	EZS: Calculated energy sum	64

TABLE 4: LIQUID FEED COMPOSITION [1] WITH NUTRIENT CONTENT

Fish meal treatment		Soyabean meal treatment	
Corn cob (adjusted to 88% DM)	50.0%	Corn cob mix (adjusted to 88% DM)	50.0%
Wheat	28.0%	Wheat	27.4%
Fish meal 64	12.0%	Soyabean meal 46	18.0%
Wheat bran	7.5%	Bone meal	1.5%
Mineral/Vit mixture	2.5%	Rock salt	0.3%
		Mineral/Vit. mixture	2.5%
		Lysine HCl	0.15%
		DL Methionine	0.13%

Both dietary treatments (liquid feeds) were based on:

corn cob mix	24.9%
supplementary feed	14.2%
water	60.9%

Nutrient content of liquid feed (both treatments):

Dry matter	25.1%		
Crude protein	4.7%	Starch	12.5%
EZS: Calculated energy sum	18.7%	Ca	0.3%
Crude fibre	1.2%	P	0.2%

[1] Ingredients adjusted to approximately 12% moisture.

TABLE 5: EFFECT OF THE TREATMENTS ON THE WEIGHT GAINS

	Fish meal treatment	Soyabean meal treatment
Initial weight kg	27.8	28.5
Weight at end of growing period kg	62.5	62.6
Final weight kg	105.0	101.1
Gain in the growing period kg	34.7	34.1
Gain in the finishing period kg	42.4	38.6
Total gain kg	77.1	72.6
Duration of growing period (days)	62	62
Duration of the finishing period (days)	48.5	53.2
Duration of the growing/ fattening period (days)	110.5	115.2
Daily gain in the growing period g	559.2	549.5
Daily gain in the finishing period g	874.7 **	724.9 **
Daily gain in the growing/ finishing period g	697.7 *	639.8 *

** $p < 0.01$ * $p < 0.05$

TABLE 6: FEED CONSUMPTION AND FEED CONVERSION WITH DIFFERENT PROTEIN SUPPLEMENTATION

	Fish meal treatment	Soyabean meal treatment
Feed consumption in the growing period kg	351.6	339.5
Feed consumption in the finishing period kg	483.2	460.5
Feed consumption during the growing/finishing period kg	834.7	800.0
Feed conversion[1] in the growing period kg/kg	10.1	10.0
Feed conversion[1] in the finishing period kg/kg	11.4	11.9
Feed conversion[1] in the growing/finishing period kg/kg	10.8	11.0
Daily feed consumption in the growing period kg	5.7	5.8
Daily feed consumption in the finishing period kg	10.0	8.7
Daily feed consumption in the growing/finishing period kg	7.6	6.9

[1] Weight of liquid feed per kg weight gain.

TABLE 7: EFFECT OF PROTEIN TREATMENTS ON DRY MATTER INTAKE AND CONSUMPTION

(Dry feedstuff = 88% DM)

	Fish meal treatment	Soyabean meal treatment
Daily feed intake growing/finishing period kg	2.15	1.97
Dry feed intake during the growing/finishing period kg	237.1	227.3
Dry feed conversion (kg/kg)	3.076	3.131

TABLE 8: EFFECT OF THE PROTEIN TREATMENTS ON THE CARCASS QUALITY

	Fish meal treatment	Soyabean meal treatment
Carcass weight kg	84.7	81.2
Carcass yield %	80.8	80.3
Trading quality class distribution (carcass grading)		
E	1.6	0.7
I	39.7	35.7
II	43.6	47.9
III	15.1	15.7